Jeffersonville Bridge
Spanning the Lamoille River on Vermont
Route 15 approximately 0.4 miles west
of the intersection of Vermont Route 108,
Vermont Route 15 and Town Highway 5
Cambridge
Lamoille County
Vermont

HAER No. VT-17

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
MID-ATLANTIC REGION, NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR
PHILADELPHIA, PENNSYLVANIA 19106

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HISTORIC AMERICAN ENGINEERING RECORD
JEFFERSONVILLE BRIDGE

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Location:	Spanning the Lamoille River on Vermont Route 15 approximately 0.4 miles west of the intersection of Vermont Route 108, Vermont Route 15 and Town Highway 5. Town of Cambridge Lamoille County Vermont Mansfield Quadrangle, Universal Transverse Mercator Coordinates 18.671400.4945450
Date of Construction:	1928
Engineer:	Bethlehem Steel Co. Bethlehem, PA
Present Owner:	State of Vermont
Present Use:	Vehicular Bridge
Significance:	The bridge is significant as a representative example of the bridges built following the flood of 1927, in which over 1250 of Vermont's bridges were destroyed. The flood was a major episode in Vermont's 20th-century history. The resulting engineering effort included the extensive use of standardized design and economical construction by which the State was able to rebuild a large number of bridges very quickly. This bridge is eligible for inclusion on the National Register of Historic Places.
Project Information:	This documentation was undertaken in April and May 1990, in accordance with a Memorandum of Agreement signed by the Federal Highway Administration, the Vermont State Historic Preservation Office, and the Advisory Council on Historic Preservation (ACHP). The Memorandum of Agreement has been accepted by the ACHP as a mitigative measure prior to replacement of the bridge in 1991.

Prepared by Alison B. Church, Project Engineer, Location & Environmental Studies Section, Vermont Agency of Transportation, Montpelier, Vermont.

1. Site Features and Historical Background

This bridge referred to as the Jeffersonville Bridge crosses the Lamoille River within the Village of Jeffersonville, which is located in the Town of Cambridge. The Lamoille River branches just east of Jeffersonville Village such that there are multiple headwaters including, but not limited to, Long Pond (adjacent to Belvidere Mountain), Lake Elmore (adjacent to Elmore Mountain) and the Caspian Lake-Flagg Pond-Horse Pond complex near Wheelock Mountain and Stannard Mountain. Horse Pond is the farthest source of the Lamoille River, approximately 40 miles from the Jeffersonville Bridge, at an elevation in excess of 1800 feet. From Jeffersonville, the Lamoille River flows west until it empties into Mallett's Bay of Lake Champlain. Lake Champlain drains north via the St. Lawrence River in Quebec which turns east to the Gulf of St. Lawrence and the Atlantic Ocean. (1)

Most Vermont towns were established by land grants many of which were made to speculators who had no intention of settling in the area. The Town of Cambridge was granted in 1780 to a group of approximately 30 men, many of whom were the Town's early settlers. The first settler arrived in 1783. Land division were originally made in 150 acre lots all with frontage on the Lamoille River. The fertile intervals of the Lamoille River in the western part of the Town attracted early settlement. (2)

Agriculture as a means of livelihood was well established when the first saw mill was constructed in 1785. Though significant contributions have been made by the lumber industry, especially in recent years, Cambridge's economy has historically been largely based on agriculture. The first harvest was corn. Dairy farming later emerged as the primary agricultural activity with butter the staple product especially in the second half of the nineteenth century. (3)

Corporate boundaries for Jeffersonville, now the largest village in the town, were first established in 1896 near the confluence of the Brewster and Lamoille Rivers. The village contained its own schools, churches, post offices, and numerous shops, including harness, shoe, tailor, blacksmith, wheelwright, and dry good shops. Numerous water powered industries operated in Jeffersonville at the mouth of the Brewster River, where it empties into the Lamoille River. Industries supported in the area included carding and clothing mills, starch factories, a sawmill, a gristmill, a planing mill and a trip hammer shop. However, Jeffersonville was not incorporated for highway purposes. (4)

The Lamoille River essentially bisects the Town of Cambridge as it winds its serpentine course to Lake Champlain. Roads on both sides and approximately parallel to the Lamoille River formed the backbone of the transportation network. From this transportation backbone, there was soon established an extensive road network that

connected farms with villages as well as markets elsewhere in northern Vermont. These connections required numerous crossings of not only the Lamoille River but also the tributaries (the Brewster River and the Seymour Brook). (5)

Vermont Route 15, of which this bridge is a component, is one of many roads within town limits that though upgraded to meet modern transportation needs has not undergone any change in alignment. As late as 1869, a turnpike at the Stowe-Cambridge Town Line (at the very southern terminus of Cambridge) was the closest semblance to the turnpike facility for Cambridge. (6)

With the exception of a few additional town roads, there is virtually no difference between a recent town map and one drawn in 1878 (Beer's Atlas). (7)

Though subject to a shortage of highways in the 1870's, Cambridge enjoyed ample railroad service. Two railroad lines had been extended through Cambridge the St. Johnsbury and Lamoille County Railroad and the Burlington and Lamoille Railroad. Jeffersonville (aka Cambridge Center) is located conveniently near Cambridge Junction, named for the junction of the two railroad lines. Large quantities of butter were shipped out of Cambridge each season, but the railroad shipping industry started to decline as the automobile industry gained momentum. In 1938, the Burlington and Lamoille Railroad was abandoned. The trucking industry, operating along highways such as Vermont Route 15, now provides transportation for the products of the still flourishing agricultural activities of the region. (8)

2. Bridge Description

The approach span of the Jeffersonville Bridge consists of 2 - 35' rolled beam spans with a concrete deck. The main span of the Jeffersonville Bridge is a single span steel Parker through truss. The 180 ft. span is composed of 8 - 22' 6" panels. Each panel is detailed as follows:

The top chords which resemble box girders with latticed undersides are built up sections composed of two channels aligned back to back with a 20 inch separation. A 20"x3/8" solid steel plate is riveted to the channels. The bottom chords are comprised of two channels with top and bottom stay plates at 4' intervals. I-beam verticals carry the compressive forces while the diagonals carry the tensile forces. The sub-diagonals, horizontal stiffeners, struts and top bracing are all composed of paired angles with lacing. Sway bracing consists of two panels with diagonals of back-to-back angles. Portal bracing consists of panels of crossed angles with top and bottom members of paired angles with lacing. (9)

The floor system is composed of I section floor beams and stringers, with angle iron cross bracing in each floor beam bay.

The bridge surface is a concrete slab. The bridge rail is a built up section consisting of angles and channels that on the truss (main) span is riveted to the verticals and diagonals of the trusses. The bridge rail on the approach spans is mounted on posts which are bracketed to the structural beams. Builder's plates are present on the inclined end panels of the truss. The abutments and pier are concrete. (10)

The only repair made to the bridge since its construction in 1928, other than patching concrete where needed in the abutment and deck was the installation of two 10" I-beams between the floor beams in 1989. (11)

Various sections of the bridge railing have been hit and bent by motor vehicles. The bearings are very rusty. The steel beams of the approach span have heavy rust scale and some section loss. In the main (truss) span, one of the floor beams has a crack in the web at both ends. The other floor beams, the fascia stringers, and the bottom chord are all rusted and have minor section loss. The truss members including the diagonals, end portals, top lateral bracing and sway bracing have rusty areas and pitting but no significant section loss. The concrete in both the deck and the abutments is cracked and has significant spalling. (12)

3. Construction

In early November 1927, three days worth of heavy rain inundated the State, resulting in the Flood of 1927. The bridges in Lamoille County sustained heavy damage such that no bridge in the county was left standing on its foundation. The majority of the bridges throughout the state at the time were either wooden bridges with laid up stone and earth abutments or stone arches and boxes. Iron and concrete bridges were common only on primary highways such as state routes. The bridge at this site on VT Rte. 15 was an iron structure, no records of type are available. Flood damage to bridges in Cambridge amounted to $15,000. (An additional $17,000 of damage to roads resulted from the flood). (13)

The Parker through truss was the most common configuration of standardized design for spans exceeding 150 feet. A combination of a standardized truss span with a rolled beam approach span resulted in fulfilling unique design requirements and facilitating the mandated mass production of bridges. At the Cambridge bridge the approaches span the flood plain and the truss spans the navigable channel. The State's bridge engineer, A. D. Bishop, made the decision to use standardized design to deal with the given time constraints imposed by the flood. "It was.. realized that it would be impossible during the winter, so as to have them available in the early spring, to draw up plans covering all the bridges to be constructed this year. For this reason, it was decided to standardize all the work possible." (14)

Having little success in the highly competitive rail market in which it originated, Bethlehem Steel Company (Bethlehem, PA) under the direction of Charles Schwab devoted substantial capacity to structural fabrication in the early 20th Century. Not only was a new plant opened in 1922, but the company expanded its capacity further by acquiring Lackwanna Bridge Works, a Buffalo based fabricator. Bethlehem Steel did not ordinarily conduct business in Vermont. However, due to the temporarily immense demand for bridge facrication, the company was able to participate in the post-flood rebuilding. (15)

4. Design and Technology

For the majority of steel bridges built prior to the flood era, the structure consisted of built up members, characterized by plates, channels and angles riveted together. Though this bulkiness resulted in very strong members, the process required extensive in-shop assembly. The standardized bridges built after the flood featured built-up members only for the top and bottom chords, with rolled I-beams for the vertical and diagonal members to connect the top and bottom chords. The use of I-beams for those members minimized the time required for assembly, thereby expediting the process of replacing the bridges. (16)

The only limiting restraint imposed by the use of standardized design was in alignment. Structures of this type required a crossing nearly perpendicular to the feature crossed. Restrictions on the skew angle resulted in roadway approaches with very tight curves, a less than desirable horizontal alignment. (17)

Standardization, as exemplified by the Cambridge bridge, was initiated in the 1910's but was not used on a widespread basis. Therefore, the significance of this bridge, as well as other standardized bridges of the era is that through the large scale use of these bridges after the flood, Vermont helped set the precedent in the bridge construction industry of utilizing rolled beams in trusses with standardized chords. (18)

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FOOTNOTES

1. "Flood Plain Information - Lamoille, North Branch, Brewster, and Seymour Rivers - Cambridge, VT" (Prepared for the Town and Village of Cambridge and the Village of Jeffersonville by the Department of the Army, New York District, Corps of Engineers, New York, July, 1976) p.1.

2. Peter Thomas et al. "Archeological Reconnaisance Survey for Cambridge BRF 030-2(12)", Report No. 89, University of Vermont, Department of Anthropology, Burlington, VT 1987) p.24.

3. Peter Thomas, p.24.

4. Peter Thomas, p.24.

5. Peter Thomas, p.24.

6. William J. Wilgus, The Role of Transportation in the Development of Vermont (Montpelier, VT: Vermont Historical Society, 1945), Fig. 9.

7. F. W. Beers, Atlas of Lamoille and Orleans, Vermont (New York: F. W. Beers and Co., 1873) pp. 34-5.

8. Peter Thomas, p.25.

9. "Historic Sites and Structures Survey - LA-05" (on file at the Division for Historic Preservation, Agency of Development and Community Affairs, State of Vermont, Montpelier, VT, May 29, 1985).

10. "Historic Sites and Structures Survey".

11. "Dictaphone Bridge Inspection Report - Cambridge BR 21" (on file in Structures Division of Vermont Agency of Transportation, Montpelier, VT, September 7, 1989), p.15.

12. "Bridge Report", p. 15.

13. "Flood Report of the State Highway Board", Records of Governor John E. Weeks, 1930, Montpelier, VT, (on file at Vermont State Archives, Secretary of the State's Office)

14. Matthew Ross and Bruce Clouette, "Vermont Historic Bridge Survey" (Final Report and Preservation Plan on File at Division for Historic Preservation, Agency of Development and Community Affairs, State of Vermont, Montpelier, VT, 1985) p. II-22.

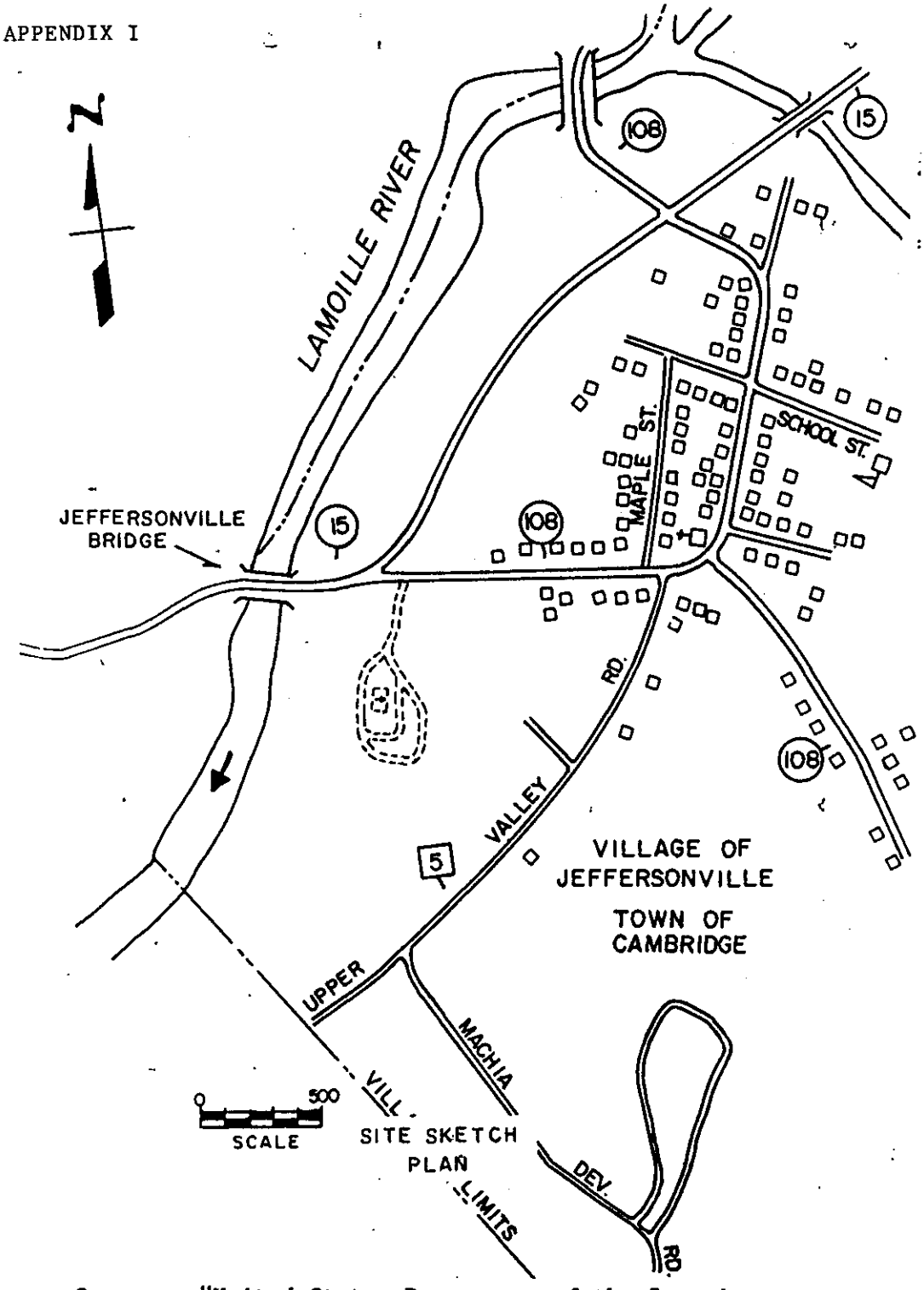
15. Ross and Clouette, Appendix 6.5.

16. Ross and Clouette, p. II-23.

17. Ross and Clouette, p. II-23.

18. Ross and Clouette, p. II-24.

APPENDIX I



Source: "United States Department of the Interior Geological Survey Map." 1927 North American datum. Reston, VA: Geological Survey, 1986.